Predicting Outcomes Of Decision-making

Stokman, F.N.; Berveling, J.

Published in:
EPRINTS-BOOK-TITLE

Predicting outcomes of decision-making

Five competing models of policy-making

F.N. Stokman and J. Berveling

Wim Polak, a former mayor of the city of Amsterdam, once noticed that Amsterdam is the only city in the world that has as many 'mayors' as it has citizens. Moreover, all of these 690,000 people have their own ideas how the city should be run which they believe to be better than those of the City Council, the aldermen and the (real) mayor (Polak 1983). In other words, the city of Amsterdam, has civilians that are strongly committed to their city. They hold outspoken opinions on issues in different policy domains. Amsterdam has also the reputation of being a 'troublesome' or 'unruly' city (Roegholt 1979). A large part of the city's history is dominated by the unconventional political behavior of its inhabitants. They have an 'anarchistic' mentality (due to a long process of urbanization, secularization and the origins of the Amsterdam immigrants) not found in the rest of the country.

Anyone interested in power, influence and decision-making in Amsterdam should, however, not view its citizens as isolated actors, but as members of policy networks. This is particularly worthwhile in view of the impressive number of no less than fourteen hundred different grassroots organizations: action groups (for instance squatter groups), more conventional neighborhood organizations, et-cetera (Nauta 1986). But apart from these grassroots organizations one should also recognize civil service organizations, firms, and advisory boards as actors in policy networks. All these groups and organizations will try to influence policy decisions that are salient to them.

This point of view (actors as part of policy networks) is an important element of the policy-making models that were recently developed in the Netherlands. Decision-making was traditionally studied mainly by (sometimes lengthy) descriptive case studies. Instead of this 'traditional' method, we propose, however, a modeling approach on the basis of formal models of policy-making developed by Stokman and Van den Bos (1992) and Stokman and Zeggelink (1996).

In 1992 Stokman and Van den Bos presented their 'Two-Stage Model of Policy-making' (the TS-model). This model was rigorously tested on two policy domains in the city of Amsterdam (Berveling 1994a). The TS-model builds upon, amongst other things, the approaches of Coleman (1972) and Laumann & Knoke (1987).

It consists of a first stage in which actors interact in order to influence the policy positions of other actors, and a second stage in which the final decision is reached. The model can be expressed in an equation from which the (positional) power of actors can be computed and the *outcome of decisions* can be predicted[1]. In Amsterdam we focussed on 10 different controversial decisions taken by the City Council with regard to the policy domains 'Urban Development' and 'Minority Policy'. More specifically, the issues concerned a Waterfront project (The IJ-shores project) and proposals on (un)employment and affirmative action. All issues were controversial in the sense that different actors favored different positions.

In the TS-model (as in other policy network models, like the Laumann and Knoke model) the network of influence relations among the actors is externally determined and fixed. Data on these relations are usually obtained by interviewing the actors and asking them from whom they receive and/or to whom they give important information. In 1993 Stokman and Zeggelink developed a dynamic computer simulation model in which actors have the capability to establish and to terminate influence relations. Because of their own limited information and the difficulty to estimate the consequences of simultaneous action by others, actors have to make rough estimates of the effects of their influence relations on the final outcome of decisions. Stokman and Zeggelink specify two basic (alternative) models. In the first model actors simply try to create relations with the most powerful actors in the network. This is denoted the Control Maximization (CM) Model. In the second model, actors are more sophisticated and make a rough estimate of the effects of their relations on the expected outcome of the decisions. This model is denoted the Policy Maximization (PM) Model. In between these base models two other models (with other specifications) are presented. In the present article we will compare the models and investigate which of them performs best.[2] The most preferable way to assess this is to predict outcomes of decision-making. By comparing predicted with actual outcomes of decision-making we can conclude which model predicts most accurate. Eight of the ten issues that were selected in Amsterdam will be used. Of these issues we will predict the outcomes of ten decisions taken by the City Council[3].

This chapter is structured as follows. First we introduce the issues and the actors that were involved in the issues on both domains. Subsequently we describe the TS-model and the dynamic access models. After explaining how we operationalized the main elements of the models, we turn to the predicted outcomes of the Council decisions in Amsterdam. We end with some concluding remarks.

Policy domains, issues and actors

In the study of Amsterdam (Berveling 1994a) we selected recent decisions taken by the City Council on two contrasting policy domains, urban development and minority policy.

A major new urban development in Amsterdam which is meant to counterbalance the upcoming high-tech area in the South East of the city. This 'IJ-Shores Project' will change the spatial and functional structure of the city. It encompasses the city's waterfront, an area just behind the Central Railway Station, at the edge of the historic city center. This area is the central part of the project and is therefore called 'IJ-Central'. Within approximately ten years, the Waterfront area will contain huge (relative to Dutch standards) office buildings, a shopping center, recreational facilities and housing.

In the Minority Policy domain we focus on the subdomain of (un)employment and affirmative action. Minorities in Amsterdam, mainly people from Surinam, Morocco and Turkey, face many problems in finding employment and often suffer deficiencies in their education. One of the most important policy aims is to assist these ethnic minorities finding employment.

Specific issues in the two domains

Let us briefly describe the selected issues and explain why they were controversial.

Issues on the Urban Development domain:

1. *Pedestrian/bicycle bridge ('Foetsbrug').* To (re)develop the Northern part of the IJ-shores project a bridge was said to be necessary. Some favored the idea (although the support was rather symbolic in nature), others strongly opposed it. The opponents argued that the bridge would delay the entire project and would form an unsafe route of traveling.

2. *Wagons Lits Hotel and Office.* A combined hotel and office building was the first project (near the Central Railway Station) to be realized within the IJ-shores framework. It was realized before a comprehensive plan for the entire area, laid down in the 'Major Points of Departure', was developed. For this reason some actors opposed it. They argued that without an official over-all plan no one could know whether the building would harmoniously fit in its general surroundings, including the historic Central Station itself. The proponents on the other hand wanted to start things going and hoped for a 'me too' effect on the part of other developers.

3. *'Quality' of the Central IJ-area.* This issue had three strongly related aspects. The first aspect was the *density* of development in the area. Investors and developers wanted as much office space as possible to make their investments more profitable. In the course of time, the planned density of the area has steadily increased. Some actors, however, feared a 'Manhatanization' of the area. In the second place there was a question of the distribution of *functions*. Investors and developers favored commercial functions (offices, convention centers) over housing and public functions (shopping centers, museums). Others wanted a mix with more emphasis on public functions. The third aspect was the *building height* in

the Central IJ-area. Two 'landmarks' of 75 meters are planned at both sides of the Central Station. Developers seemed to favor a building height of 85 to 100 meters, but several grassroots organizations strongly opposed this.

4. *Shopping Center.* A huge shopping center of 30,000 m^2 was planned near Central Station. The central controversy involved its size (i.e., the *number of square meters*). The mall would generate competition for shops in the inner city. Instead of 30,000 m^2 existing shop owners wanted no more than 8,000 or 9,000 m^2 to be built.

5. *IJ-boulevard.* To make the new building projects accessible, a new road along the waterway is necessary. A dispute evolved about capacity (in terms of the number of lanes). The road originally planned had two lanes. Developers wanted at least four lanes. Their opponents point to the effects of a four-lane road on air pollution (an increase by 12 percent). Several other alternatives (partly four, partly two lanes) also played a role in the discussion.

6. *KNSM-island.* This island is used for housing facilities. Three plans based on different points of departure competed. A redevelopment plan for the island drawn up by squatters (one of three alternatives) was finally rejected.

Issues on the Minority Policy domain:

1. *Registration of ethnicity.* To assess the effects of affirmative action, some groups suggested the need to know who belonged to which ethnic group. Their opponents pointed out that there were other ways to assess whether affirmative action was working or not and that registration was unnecessary. The use made of official registrations of such a kind during the Second World War made them distrust any such policy measure[4].

2. *'Eastern market' issue.* A businessman asked for permission to move a large indoor market for immigrants to an abandoned automobile factory in Amsterdam. His proposal was rejected by the Mayor and Aldermen despite the fact that the market would have meant work for hundreds of immigrants. One of the main reasons for not allowing the transfer was that the factory was surrounded by industry (transshipment of dangerous goods) that would not go along with the many visitors of the market.

Actors

The level of our analysis is not the individual but the organization (the corporate actor). In our view *organizations* are the most important players in the political game. The many organizations that are, in one way or another, involved in the selected decision-making processes can be grouped in five categories: Governing

Bodies, Business, Grassroots Organizations, Political Party Organizations and the Civil Service.

Governing Bodies play a part in the issues at different levels. At the local level, we find actors like the Mayor and Aldermen (for instance alderman Van der Vlis, a 'power broker' on the IJ-shores domain) and the political parties represented in the City Council. The Social Democrats (PvdA) have dominated the City Council since the Second World War. They occupy the largest number of seats within the Council. At the Provincial level and the National level we find actors like the Provincial Physical Planning Commission and the National Physical Planning Agency (on the Urban Development domain) and the Coordination Bureau of Minority Policy of the Ministry of Domestic Affairs.

The Business category is made up of developers, private investors, the Chamber of Commerce, et cetera. One of the largest Dutch developers is the MBO-Development Corporation, a daughter of the Dutch NMB-Postbank.

The Grassroots Organizations involved in the selected decision-making processes are groups within the Amsterdam neighborhoods and other community groups, independent advisory boards, minority groups and various institutions. As we noticed in our introduction, one cannot overlook these actors. Just as the more formally organized actors in the other categories one must take these actors into account.

Most of the Political Parties that are active at the local level in Amsterdam can also be found at the national level in the Netherlands. In Amsterdam we find the Social Democratic Party (PvdA), the Liberals (VVD), the Christian Democrats (CDA) and some small left wing parties working together under the heading of 'Links Akkoord' (nowadays called Green Left).

Finally, the Physical Planning Department and the city's Real Estate Department play a key role in the category 'Civil Service' in the Urban Development domain. In the Minority Policy domain we find actors like the Coordination Bureau of Minority Policy and Economic Affairs at the city hall.

Formal models of Policy-making

The models of political decision-making in this article build upon a number of different approaches (Coleman 1972; Hoede 1978; Hoede & Bakker 1982; Bueno de Mesquita et al. 1985; Laumann & Knoke 1987) that model various aspects of political decision-making. Most often, this is done in formal mathematical language. The Two-Stage (TS) model, the Control Maximization (CM) model, and the Policy change Maximization (PM) model can be regarded as an integration of the models of the authors mentioned above. They combine essential features of power, influence and decision-making. They can be used for an assessment of the (positional) power of the actors that are involved in a specific decision-making process and to predict the outcomes of that process.

First, we will discuss the most important model elements of the TS-model. Secondly, we will discuss each of the two stages and the submodels that are associated with them. A more comprehensive treatment can be found in Van den Bos (1991) and Stokman and Van den Bos (1992).

The Two-Stage Model of Policy-making

The TS-model can be applied to social systems in which *collective* decisions are reached. One can think of decisions taken by the City Council of Amsterdam. The main feature of political decision-making is its binding character. Collective decision-making is an essential part of the model because it directs attention to non-dyadic forms of power. Decision-making of a binding collective nature has an effect on *all* the actors within the system.

The model distinguishes public actors and private actors. Public actors are the actors that can vote on the decisions that have to be taken. In this research, the public actors are the political parties represented in the City Council of Amsterdam. The private actors are, in one way or another, involved in the decision that has to be taken. Here, private actors are conceived of as pressure groups. Both types of actors are taken into account in the model on the basis of the idea that, although public actors take the decisions, they do not reach decisions in a societal vacuum. Private actors will try to influence the outcome of the decision-making process.

In the model of decision-making are of central importance: voting power, access, resources and salience. Each of these will be discussed below.

The (public) actors that, in the end, make collective decisions are actors that have *voting power*. While this is the most simple type of power in decision-making processes, it is not the only type. In (policy) networks, another type of power is relational (Mokken & Stokman 1976). This type of power consists of the *access* actors have to other actors or, to put it differently, of the position those actors occupy in a network of social relations. The *resources* that are at the actors' disposal are the substantive part of power. These resources can consist of financial means, expert knowledge, et cetera.

In the model, access and resources are integrated in the term *control*. Both elements of control are essential. An actor can have many resources, but if he does not have the social relations through which these resources can be used, the resources are useless. Conversely, access without resources is irrelevant.

The exercise of power is dependent on the motivation of an actor. Therefore the more *salient* a certain decision is to an actor, the more willing he will be to exercise his power.

Stokman and Van den Bos have used these elements in a single comprehensive model of political decision-making. They define as the positional power of an actor (either public or private): his abilities to (1) exercise control over public actors with voting power with regard to decisions that are salient to them, and/or (2) exercise voting power over these decisions.

Stages and submodels

The model distinguishes two stages in the policy-making process. In the final stage of the policy process, the public actors make decisions on the basis of their voting power. This stage is preceded, however, by a stage in which public *and* private actors try to influence the positions of the other actors with regard to the decision that has to be reached. On the basis of this influence stage, public actors can change their initial policy positions and, ultimately, make a decision that is adapted to the policy positions of private actors.

The empirical demarcation between these two stages in policy processes is not always clear-cut. Analytically, however, the two stages are important because they differ in the nature of power and influence processes. In the stage in which the decision is made, the voting power is dependent on the decision rule (simple majority, qualified majority or unanimity) and the relative weights of the actors in the voting procedure (Hoede & Bakker 1982). In the earlier stage of influence, actors will try, directly or indirectly, to control the policy positions of actors with voting power. Their willingness to do so is, as mentioned before, dependant on how salient the decision is to them.

The two stages in the policy process are modeled as submodels: a voting power submodel and an influence submodel. Together, the two submodels constitute the 'Two-Stage Model of Policy-making'. The two submodels will be discussed in more detail below. This will be done in an informal fashion. The formal reflection of the model can be found in Stokman and Van den Bos (1992).

The voting power submodel

The voting power submodel is based upon Coleman's social exchange model (1972), but integrates it with Hoede and Bakker's decision model (1982). Instead of 'control over events', we will talk about the voting power of actor i over decision k in the model. The voting power depends on the decision rule and the relative weights of the actors. This submodel reflects the *direct* influence of actors with voting power on the policy process.

The influence submodel

The control component is comprised in this submodel. It can be established independently from the voting power submodel that was discussed above. It consists of access and resources. In other research these elements are often not regarded separately,but in the model used here, they are, and are subsequently integrated in the control component.

The measure of control as used in the influence submodel was developed by Hoede (1978). The amount of control that actor i can exercise over actor j is dependent on whether or not i has access to j and on the resources of i, of j, and of all other actors with access to j.

Control and the element (not the submodel) voting power together form the influence submodel. This submodel reflects the *indirect* influence of actors on the policy process, before the actual decision is reached. Actors without voting power

of themselves will try to exercise control over other actors including those with voting power, in order to influence their policy positions.

Predicting outcomes of decision-making

The model can be used to make predictions of the outcomes of the decision-making processes. In this sense, the model follows the line of Bueno de Mesquita et al. (1985) who regard the prediction of 'political events' as their main goal. The ultimate test of the model is the comparison of the predicted with the actual outcomes of the decision-making processes. In this sense the approach has been successful so far (see Stokman & Van den Bos, 1992 and Berveling 1994a). Stokman & Van den Bos were able to predict seven out of eight events (87%) in the U.S. national energy policy domain (the data were made available by Laumann & Knoke 1987). Berveling was able to predict approximately 80% of the more than fifty outcomes of decision-making in the domains of urban development and minorities policies in the city of Amsterdam.

The first part of generating the predicted outcome of the decision-making process consists of a prediction of change of the policy positions of the actors, in particular of the (public) actors that have voting power. This is done on the basis of the influence stage of the model. The new policy positions of public actors are the weighted sum (according to the amount of control and the salience of the actors) of their own policy position and the policy positions of the actors that influence them. The actual decision outcome, the second part of the prediction, is computed as the weighted sum (according to the voting power of the public actors) of the (changed) policy positions of public actors.

The main idea behind this is that the public actors, which have to take the final decision in the end, take the positions of other (private) actors into account in their considerations. The different positions are weighted and translated into a final decision. An actor uses his resources and his access to other actors in order to change positions that deviate from its own position. The willingness of actors to invest their resources through access to other actors depends on the salience of the decision that has to be reached.

The dynamic access models

In the TS-model the only dynamic elements are the policy positions of the actors and the collective outcomes of the decisions. The TS-model does not contain alternatives between which actors can choose to maximize their goal attainment within certain restrictions. In other words, the model does not contain a *micro* model. Such a model would make it possible to simulate the *dynamics* of policy processes such as the developments of relations within the network. This is the aim of the dynamic access models of Stokman and Zeggelink. In these models, actors have the ability to create and shift access relations within certain restrictions.

Within a policy domain, the highest goal of actors is assumed to be the attainment of policy outcomes that are as close as possible to their own preferences (policy positions). These outcomes are determined by the public actors with voting

power on the decisions (as simulated in the second phase of the TS-model). In the access models it is also assumed that these public actors, like other actors, shape their own policy positions in the influence stage. The sole means by which relevant private actors are able to realize a more favorable outcome of a decision consists of trying to shift the policy positions of public actors. In the influence stage, optimal shaping of policy positions of other actors can therefore be seen as an important intermediate goal of actors. Success depends on whether the actor has timely access to other actors, and on his ability to mobilize important resources to shape the policy positions of these others. As such, the appropriate model in this stage is more akin to a *marketing* model than to an exchange model.

Each actor has only limited resources. Access relations require time and efforts (like information to be gathered and ordered). Consequently, an actor is unable to establish and maintain access relations to all other actors. Each actor has to choose which access relations he wants to establish. For such a choice, a rational actor needs an enormous amount of information to compare the expected utility of alternative access relations. Moreover, he has to make very complicated computations. Even when that would be feasible, an actor is still not certain about the final result as other actors are simultaneously optimizing access relations. It is really unthinkable that actors are also able to take that aspect properly into account. We therefore assume that actors will not make these complicated comparisons and computations. Rather they will formulate instrumental goals (heuristics) that require less information and computation. However, actors will evaluate these 'rules of thumb' and will make corrections if they fail. In other words, actors learn from the past.

How are access relations established in the dynamic models? An access relation from actor i to actor j is created if a *request* for access by actor i is *accepted* by actor j. The network of access relations is being established in different iterations. Each iteration exists of three steps. In the first step actors make requests for access. Quite often, choices have to be made here, because actors are allowed to make only a limited number of requests. In the second step, actors accept or reject requests. Again choices have to be made, at least if an actor received more requests than he can handle. *Accepted requests become directed access relations.* In the third step, the influence process takes place. Each actor gets a new preference (policy position) being the weighted mean of his own preference and that of the actors with access to him. This influence process is modeled as in the TS-model. Subsequently, all actors adapt their 'cognitive image' of the policy domain. They recognize the new policy positions of the actors and adapt their estimates of the expected outcomes of the decisions, the power of the actors and the probabilities of acceptance of future requests. At each iteration each access relation is reevaluated. Each access relation can therefore disappear if no new request is made or if the new request is not anymore accepted. After a number of iterations, the decision makers (public actors) vote with the preference they have at that moment.

We first consider the restrictions actors are confronted with. Subsequently we specify the alternative dynamic models. These models differ from each other in

three main elements. The first is the estimate of the utility of alternative requests for access. The second is the estimate of the likelihood of success, *i.e.*, the likelihood that the other actor will accept the request. The product of the two determines the *expected utility* of alternative requests and the rank order in which the actor makes the requests. The third element concerns the rank order in which actors accept requests. The two basic models differ in all three elements.

Restrictions with respect to access relations

Establishment and effectuation of access relationships require time and other resources. Consequently, we assume that the maximum number of access relations an actor can deal with depends on his resources. Also, incoming influence requires the allocation of time and other resources to these activities. If actors were solely oriented toward advancing their own policy positions, they would spend all their time and resources to outgoing access relations, and refuse incoming influence. If all actors in an issue domain would act so, no influence would be realized at all. What, then, determines whether or not an actor will accept an incoming access request? Incoming relations are important for an actor, because they provide him with information on the relevant actors in the policy network, and in this manner help him to shape his own policy position. Moreover, an actor's claim that his policy position is based on information provided by many other relevant actors, contributes to his influence on other actors. In other words, incoming relations contribute to an actor's resources. Next, in any society, but particularly in a democratic society, it is a drawback for a powerful actor to be seen as unwilling to accept influence from other actors. Finally, actors often seek information (and consequently accept influence) from different actors than they themselves try to influence. For example, in preparing an interview with a member of parliament, an actor may consult different experts to ground his preferred positions on sound arguments. We incorporate these mechanisms into our model by applying the principle of *generalized reciprocity*. This principle is well known in personal network theory (Alexander 1987; Boyd & Richerson 1989). It is employed to explain why certain social exchange relations in personal networks remain asymmetrical, instead of becoming more reciprocal. In a social system, these asymmetrical relations are tolerated as long as an actor is willing to help another actor in case the latter needs it. The same principle of generalized reciprocity can be found in the field of international economics when import and export relations are considered. Imbalances between import and export quota between two individual countries are tolerated as long as the balance of payments for each country is in equilibrium. Translated to issue domains, the generalized reciprocity principle implies that *outgoing control or voting power should be balanced by incoming control.*

The above considerations result in the following specifications regarding the maximal number of requests actors are allowed to make and the number of requests they have to accept. The maximal number of requests an actor is allowed to make at time or iteration (t+1) is a function of the resources of an actor and the number of

incoming relations at time t. On the other side, the larger the resources, the voting power, and the number of outgoing relations at time t of an actor, the more requests that actor has to accept at time $(t+1)$.

Estimation of utility of requests

First, we specify the information actors are assumed to possess about an issue domain. Since institutional arrangements belong to the public domain, we assume that actors have full information on the distribution of voting power over the actors in the issue domain. Moreover, we assume that actors are able to estimate the policy positions, saliences, and resources of all actors in the domain. With respect to the control (influence) network, we assume that an actor is unable to observe the precise control relations from and to other actors. Knowledge of these relations would imply access to very sensitive information on all informal meetings and bilateral contacts between actors. Actors are able, however, to make an estimate of the total amount of control by and on each actor in the issue domain.

On the basis of his partial information, each actor is able to compute the expected outcomes of the decisions at the different points in time. However, actors are unable to calculate both the effects of access relations on shifts in policy positions by target actors and their subsequent effects on the decisions to be made. An actor i does not know who else is exerting control on actor j, let alone in which direction they try to move actor j. Moreover, he does not know the identity of the actors who are under the control of actor j. He is therefore not able to estimate the final effect of a successful access relation on the policy positions of actors with voting power. He only knows the total amount of control actor j is able to exercise in the issue domain.

The two basic models differ from each other in the actor's estimates of the utility of alternative access relations. In the *Control Maximization-model* (CM-Model) actors base their utility estimates on the power actors have in the policy domain. Since the actors in the issue domain know the total control and voting power of each actor, actors may decide to optimize their control over powerful actors in the issue domain. The importance of each actor for actor i in the final vote is determined by the actors' voting power multiplied by actor i's salience on the decision under vote. Besides, the importance of each other actor in the influence process is determined by the other actors' total control. In addition, actor i needs an estimate how much control he is able to exert on the others. Under the assumption that other access relations do not change, actor i is indeed able to estimate his control over actor j. It is equal to his own resources divided by the total amount of resources that is effective on actor j (*i.e.* the resources of actor j and the resources of all actors with access relations to j). The rank ordering of the alternative access relations for actor i is based on the sum of the two power components multiplied by the estimated control of actor i over the other actor. Stokman and Zeggelink denote this estimate the '*Control Request specification (CR)*'. Note that actors do not at all take the policy positions of other actors into account.

In the *Policy Maximization-model* (PM-Model), actors use their knowledge on the policy positions of other actors and the expected outcome of the decision. In this more sophisticated specification, actors still focus their efforts on the actors who have great control and voting power in the issue domain. However, they also consider in which direction the policy position of the target actor will possibly move as a result of an established access relationship. This factor determines whether a subsequent shift in the expected outcome will have positive or negative consequences for the actor. This is illustrated in Figure 1. We assume that actor i wants to optimize his access relations at time t, and that actor j has a more extreme policy position than actor i on the same side of the expected outcome. An access relation from i to j would result in a less extreme position of actor j at time $(t+1)$, and would result in a shift of the expected outcome of the decision in the wrong direction (away from the policy position of actor i). Consider instead a successful access relation of actor i to actor k. Such an access relation would result in a shift by actor k in the direction of the policy position of actor i, and, consequently, to an expected outcome closer to actor i's policy position. *Thus, in general, influence on actors with a more extreme policy position on their own side of the expected outcome is counterproductive.* Access relations to other actors with exactly the same policy positions have no direct effect (at most it can damper effects of other actors). In all other cases, an access relation has a potentially positive effect. This effect will be larger, the larger the distance between the policy positions of the two actors. If more decisions are involved, access relations gain importance if they affect outcomes of decisions on which the distance between the expected outcome and the policy position of the actor is large. Moreover, the utility gain is higher for more salient decisions. If we incorporate these elements in the estimate of the utility of the *CM-model*, the utility estimates of the *PM-model* result. Stokman and Zeggelink denote this estimate the '*Policy Request specification (PR)*'.

The choice of access requests does not only depend on the utilities, but also on the likelihood of success. This likelihood of success depends on the order in which actors accept access requests. For that reason we first consider the alternative specifications for the acceptance of access requests before we deal with alternative specifications for the estimation of the likelihood of success.

Acceptance of requests

If an actor receives more requests for incoming access relations than he is allowed (or needs) to accept, he has to decide which to accept and which to refuse.

In the *CM-model*, actors have to accept requests in the order of the resources of the proposing actors ('*Control Acceptance specification*' or *CA*). If a choice has to be made between actors with equal resources, a random choice is made. Under this specification, the choice between incoming access requests is independent of the policy positions of actors. In the example of the alderman in Amsterdam, it is unthinkable that the alderman refuses incoming influence requests of powerful actors with the justification that he receives already so much influence from less powerful actors. In the *PM-model*, on the contrary, the order of acceptance depends

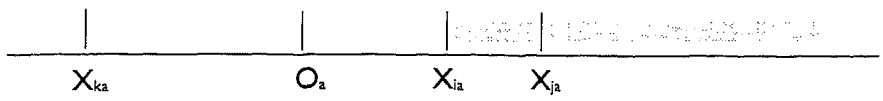

Figure 1 Expected outcome (O_a) and policy positions of three actors on decision a

on the proximity of the policy positions of the other actors and is completely independent of the resources of the actors (*Policy Acceptance specification* (*PA*)). The reader should realize, however, that an issue domain only consists of actors with positive resources. Within this boundary, however, the only thing that counts is distance. The larger the distance between the policy positions of actors, the more reluctant they will be to accept influence from one another. For example, an extreme left wing actor might gain a lot by influencing an extreme right wing actor. Most of the time, however, the right wing actor will not be receptive to extreme left wing influence, particularly not, if it concerns decisions that are highly salient to the right wing actor. Moreover, we assume that close distances matter more than large ones. In other words, actors care more about differences in preferences among actors they feel similar to. Different preferences between distant actors matter less. This acceptance rule of access requests makes actors as immune as possible against changes in their own policy positions. While trying to influence distant actors, they try to uphold their own policy position by giving priority to influence from like-minded actors. Only if these are not present in the issue domain or if these make no access requests to them, actors are forced to adapt their own preferences. This acceptance rule incorporates the frequent conclusion that decision makers engage in 'bolstering', giving too much attention to sources that share the decision maker's own predispositions (Calvert 1985). We can even state that the rule explains 'bolstering' as rational behavior to prevent the expected outcome from shifting in the wrong direction. Moreover, this acceptance rule reflects the finding from many policy network studies that political actors interact primarily with others who share their policy preferences (Bauer *et al.* 1963; Heinz *et al.* 1993) and that strong conflicts often arise among actors about slight differences of opinion.

Stokman & Zeggelink give two other specifications for the acceptance of requests. These two contain an interaction term between the resources and the distance in policy positions. The first specification, denoted *Control/Policy Acceptance specification (CPA)*, lies in between CA and PA: actors correct the ranking of actors based on resources for the distance between policy positions of the actors. In the second the 'bolstering' effect is even larger than under PA. Actors select access requests of the most powerful actors if their policy positions are close to their own policy position. If the difference between their own and the other's position is larger than a certain threshold, they select the *least* powerful actors. Beyond the threshold, actors thus try to minimize the influence they are subject to. Such access

relations have a more or less symbolic meaning. They demonstrate that the actor is open for broader influence but at the same time he tries to minimize that influence. Even more than under the PA specification, actors select access requests in such a way that they can maximally uphold their own policy position while trying to influence others with quite different policy positions. For that reason, this interaction specification was denoted the *Policy/Legitimation Acceptance specification (PLA)*. Stokman & Zeggelink chose the threshold at 10 percent of the range of all policy positions.

Estimates of the likelihood of success

We now return to the actor's estimate of the likelihood that an access request will be accepted. Under the CA and CPA specifications, actors realize that the likelihood of acceptance of their access requests depends on their relative amount of resources. Requests of actors with large resources are more likely to be accepted. Moreover, actors also realize that actors with large resources will probably be attractive targets for many actors in the policy network. Accordingly, powerful actors will have to refuse more access requests than less powerful actors. Under the PA, CPA, and PLA specifications, actors realize that the likelihood of acceptance of their access requests depends on the proximity of their own policy positions to those of the target actors. We therefore formulate two simple alternative estimates actors make for the likelihood of success. The first estimate (denoted *Control Likelihood specification* (*CL*)) is based on a comparison of his resources with those of the target actor, the second (denoted *Policy Likelihood specification* (*PL*)) on a comparison of their policy positions.

In both models, we assume that actors are able to *learn through experience.* If an access attempt of actor i to actor j is not accepted by actor j, actor i will reduce his estimate in subsequent iterations by 0.1 until the lowerbound of 0.1.

Summary: the dynamic access models

On the basis of the three main elements we are able to describe the alternative models in a compact way.

The *Control Maximization Model* (*CM-model*) is based on:
- utility estimates of requests based on power (CR);
- estimates of likelihood of success of requests based on resource comparison (CL);
- acceptance of requests from actors with the largest resources (CA).

The *Policy Maximization Model* (*PM-model*) is based on:
- utility estimates of requests based on effects on decision outcomes (PR);
- estimates of likelihood of success of requests based on policy position comparison (PL);
- acceptance of requests from actors with close policy positions (PA).

These two models are seen as the two basic models as they differ in all three elements. In between the two base models we find the *Control/Policy interaction Model* (*CP-model*) in which the specifications PR and CL are combined with acceptance of requests from resourceful actors with a discount on policy distance (CPA).

Even more extreme than the PM-model is the *Policy/Legitimation Model (PL-model)* in which the specifications PR and PL are combined with acceptance of requests from resourceful close actors and powerless remote actors (PLA).

Operationalization of the model elements

We tried to interview all 287 actors who were apparently involved in the selected issues. An overview of the selected issues was presented to spokesmen of the organizations. They were asked to indicate the issues in which their organization was involved. Forty-two of the 287 actors indicated to be involved in none of the issues. Of the remaining 245 organizations 204 could be interviewed. This response rate of 83 percent seems reasonable. The interviews delivered the following data on the model elements.

First, the respondents were asked directly to indicate the *salience* of the decisions for their organization on a scale from zero (no salience) to 100 (extremely important). Second, we asked for their *policy positions* on the decisions. For pro/con decisions (like the Foetsbrug-decision), the spokesmen could indicate of whether their organization was in favor (+1) or opposed to (-1) a decision. For decisions with discrete alternatives (like the IJ-boulevard) they could indicate the alternative they preferred. For continuous decisions (like the building height) they indicated the value on the numeric scale. In the next step, the element *access* was determined. We presented a list with organizations in the policy domain to the respondents and asked them from which organizations they received information and advice. The marked organizations were considered to have access to the interviewed organization. In this way the network was collected. Fourth, data on *resources* were collected. We presented a list with eight power resources. Respondents had to indicate which resources were available to organizations they considered powerful. The allocated resources of each organization were combined into one score on resources. Finally, the *voting power* of public actors was determined independently of the interviews. The voting power of the factions in the City Council depends on the decision rule (in this case simple majority of votes) and the number of seats in the Council. Because of its large number of seats, the Labor faction PvdA had the largest voting power. All these data made it possible to predict the outcomes of the selected decisions through computer simulation.

Results

Below, we compare the predictions of the decision outcomes for each of the five models with the real outcomes. As stated above, the dynamic models also generate networks of access relations between actors. The TS-model, however, makes use of a static network, obtained through the interviews with the spokesmen. We wonder whether the dynamic models generate similar networks as the empirical

network. We are not interested in the exact reproduction but in the similarity of structures. These comparisons will be discussed for the two basic models on two decisions.

The real and predicted outcomes of policy processes

Table 1 contains the real and predicted outcomes of the ten decisions in the eight issue domains described earlier. We predicted six Council decisions in the policy domain urban development (IJ-shores) and four in the policy domain of minority policy. In the last column of Table 1 the real outcomes are listed. For a number of decisions only two outcomes are possible, namely 'accepted' or 'rejected'. For this type of decisions, the last column contains a '+' if the decision is accepted and a '-' if it is rejected. For the building height and the shopping center the number of meters is predicted. For the other decisions the alternatives are indicated with numeric values. The other columns of Table 1 contain the predictions of the five models. For the dynamic models these predictions are based on 100 simulations, each consisting of five iterations. For the accepted/rejected decisions the models generate a value between +1 and -1. If the value is positive, the model predicts that the decision will be accepted. If the value is negative, that it will be rejected. The deviance from zero indicates how certain the prediction is. With the building height and the shopping center the models generate directly the outcome. For the decisions with different alternatives the prediction is the alternative with the closest numeric value.

It is quite clear from Table 1 that the strongly policy oriented models (PM- and PL-model) consistently give better predictions than the power oriented models.

Table 1 Predictions of outcomes of Council decisions (Std. Dev. between brackets)

Code	Decisions	Predicted outcomes					Real outcomes
		TS-model	CM-model	CP-model	PM-model	PL-model	
Issue domain IJ-shores							
STA002	Foetsbrug (Jan. 10, 1990)	+.00	+.61 (.15)	+.28 (.12)	+.27 (.14)	+.06 (.11)	-
STA004	Wagon Lits (April 19, 1989)	+.17	+.73 (.05)	+.76 (.10)	+.52 (.12)	+.17 (.08)	
STA016	Building height (meters), (Jan. 10, 1990)	74	72 (.48)	73 (.63)	74 (.75)	73 (.72)	75
STA019	Shopping centre (square meters) (Jan. 10, 1990)	23906	24002 (333)	25588 (854)	26101 (766)	26229 (670)	30000
STA027	IJ-boulevard alt. (Jan. 10, 1990)	4.45	4.08 (.23)	4.03 (.32)	4.64 (.33)	4.47 (.14)	5
STA032	KNSM-island alt. (Sept. 20, 1989)	1.28	1.05 (.02)	1.21 (.10)	1.37 (.14)	1.61 (.13)	1.5
Issue domain minority policy domain							
MIN002	Registr. etnic. (June 1, 1988)	+ .74	+.88 (.03)	+.97 (.03)	+.88 (.08)	+.88 (.03)	
MIN004	Registr. etnic. altern. (June 1, 1988)	2.52	2.26 (.05)	2.32 (.06)	2.40 (.12)	2.67 (.06)	3
MIN006	Registr. Obj./subj. (June 1, 1988)	+.70	+.98 (.02)	+.94 (.04)	+.96 (.06)	+.76 (.05)	
MIN013	Eastern Market (Febr. 26, 1988)	-.28	-.47 (.11)	-.41 (.13)	-.26 (.22)	-.12 (.12)	

Even in comparison with the TS-model the predicted outcomes of the two policy oriented dynamic models are closer to the real ones. The TS-model and the two strongly policy oriented models (PM- and PL-model) each give seven good predictions out of ten. Each of the two strongly power oriented models (CM- and CP-model) give only five good predictions, *i.e.*, half of the decisions. For the interpretation of these results we should keep in mind that the predictions of the TS-model are also based on the information on the network between organizations as obtained from the interviews. In the two dynamic access models the empirical network does not play a role. The network data are, as it were, thrown away and the actors gradually build a new network from scratch. This implies that the dynamic access models need much less empirical data than the TS-model. Nevertheless, the CM and PL-model give predictions at least as good as the TS-model. In one important respect the PM-model is even better. In the TS-model most predictions are close to the center of the decision dimensions. In other applications outside Amsterdam the TS-model was also unable to predict extreme outcomes (Berveling 1994b). This is due to the fact that, first, policy positions of actors are averaged in the influence stage and, subsequently, the expected outcomes are based on the (weighted) mean of the public actors. Surprisingly, this strong tendency toward the center is not observed in the dynamic models. This can clearly be seen in Table 1 for the dichotomous decisions. The dynamic models predict almost always with a high certainty that the decisions will be accepted, whereas the predictions of the TS-model are safely in the middle most of the time.

The PM-model gives wrong predictions for three decisions. With a predicted outcome of 2.40 for the substantive decision on registration of ethnic minorities the prediction is just under the border of 2.50. For the Eastern market a negative outcome is predicted with a likelihood of .26 whereas the decision was positive. Just in the opposite direction, the PM-model predicts a positive outcome for the Foetsbrug (+.27), whereas the real outcome was negative. It should be noted, however, that these two decisions are wrongly predicted by all models. In the TS-model and the CM-model decisions are not linked with each other. This implies that the prediction for each individual decision remains the same, irrespective of whether we are dealing with one or more decisions. In the policy oriented models, actors take the expected outcomes, the saliences and policy positions of all decisions into account when they optimize access relations. These models can therefore generate fundamentally different predictions of decisions if we link decisions with each other. As the three registration decisions dealt with one issue and were closely linked with each other, we based our predictions on these decisions in Table 1 on a groupwise analysis of the three decisions. The results of all other decisions in Table 1 are obtained through separate simulations. One may wonder whether this is justified for the first two IJ-shores decisions. The debate on the Foetsbrug and the hotel Wagon Lits near Central Station started simultaneously. If we link the two decisions in the dynamic models, the predictions for the Foetsbrug change fundamentally in the two policy oriented access models (see Table 2). The PM-model now predicts a negative outcome with a probability of no less than .29. The

prediction for Wagon Lits remains positive and is even strengthened (from .52 in Table 1 to .61 in Table 2). In the PL-model we see something similar for the Foetsbrug, but there the likelihood for a positive decision for Wagon Lits falls from .17 to .03. Evidently, the two decisions were linked, so that an interaction effect exists between them. This is a strong indication that support for the Foetsbrug was more symbolic than real. Some actors made a remark in that direction in their interview.

Based on these results, we conclude that the policy oriented models PM and PL perform very good, even in comparison with the TS-model. Important elements in this comparison are that these models give better predictions for extreme outcomes than the TS-model and that they are sensitive for decision linking. Another important advantage is that they need much less empirical data. Network data are particularly difficult to collect but they are not required anymore in these policy oriented models. The power oriented models perform clearly worse. This was found in other studies as well (Stokman & Zeggelink 1996). The difference between the power and policy oriented models is here even underestimated because many actors have an unknown policy position on a number of decisions. In that case the policy oriented models also assume that these actors optimize only on power. With less missing data the results are likely to be even more differentiating between the various kinds of models.

The network structure

In this section we focus on the network structures generated by the basic dynamic models for two decisions, Foetsbrug and Wagon Lits. We compare the networks of the linked decisions solution (Table 2) of the two basic dynamic models with the empirical network. Subsequently, we compare the networks of the PM-models for the linked decisions and Foetsbrug alone, because they generated such strongly different predictions for the Foetsbrug. The networks of the dynamic models are obtained by taking the average control for each ordered pair of actors over one hundred simulations. As not all directed lines are generated in each simulation, these networks are substantively denser than the ones generated in each separate simulation (see also Stokman & Zeggelink 1996). We think that this is justified because the empirical network is obtained for the whole policy domain of urban development (IJ-shores). The relations in the empirical network consequently also indicate a certain likelihood that such a relation is used for influence, not that it will be present in each influence process in the domain.

Table 2 Predictions Foetsbrug and Wagon Lits as linked decisions (Std. Dev. between brackets)

Code	Decisions	Predicted outcomes					Real outcomes
Issue domain IJ-shores		TS-model	CM-model	CP-model	PM-model	PL-model	
STA002	Foetsbrug (Jan. 10, 1990)	+.00	+.64 (.13)	+.30 (.20)	-.29 (.15)	-.22 (.13)	-
STA004	Wagon Lits (April 19, 1989)	+.17	+.70 (.05)	+.63 (.10)	+.61 (.07)	+.03 (.07)	+

In Table 3 we give two network parameters for the empirical network and for the basic dynamic model solutions for the linked decisions. The density is based on the number of directed lines in the network and expressed as fraction of all ordered pairs of actors in the network. The index H of heterogeneity is based on the variance of the degrees of the points. The larger the variance, the more hierarchical the structure of the network. In that case there are actors linked with many others as well as actors with only few relations. The index H is the sole measure in which the hierarchical structure of networks with different numbers of lines and points can be compared (Snijders 1981).

The data in Table 3 indicate that the density of the PM-model is not much lower than the density of the empirical network, in sharp contrast with the density of the CM-model. The introduction of policy positions clearly generates much richer networks than simple power based models do. Both models produce, however, networks that are too hierarchical. They do not generate sufficient relations among the less powerful private actors. Apparently, in real politics private actors use other private actors more often as brokers than in the simulation models.

Table 3 Network density and heterogeneity

Issue domain	network	density	heterogeneity (H)
Wagon Lits/Foetsbrug (n = 43)	Empirical network (Fig 2)	.35	.31
	CM network (Fig 3)	.07	.37
	PM network (Fig 4)	.26	.49

For a more detailed insight in the structure of the networks, we present most of the relations in the empirical network in Figure 2. Each cell gives the amount of control (the potential influence) of the row actor over the column actor. On the main diagonal (italics) the amount of self control of an actor is given. The last column gives the total control of each actor over other actors (exclusive the self control). The actors are ordered according their control over other actors. The sum of all incoming control (including the self control) is one for each actor. Each column sums therefore to one in Figure 2. In a similar way, Figures 3 and 4 contain most of the relations in the networks generated by the two basic models for the linked decisions. Figures 3 and 4 show clearly the hierarchical structure of the generated networks. Interestingly enough, the dynamic access models generate the primary responsible alderman Van der Vlis as the most powerful actor, although he has no voting power. The amount of control of the actors over other actors is highly correlated for the three figures. The correlation between the empirical network and the PM-model is r=.84, between the empirical network and the CM-model r=.94, between the PM-model and CM-model r=.91.

In Figure 5 the network generated by the PM-model for Foetsbrug alone is given. It shows remarkable differences with Figure 4. Now the two Council factions in favor of the Foetsbrug are the most central actors, not the responsible alderman Van der Vlis. Another remarkable difference is that the Department of Physical

Planning is the third central actor for the linked decisions and very marginal for Foetsbrug alone. Indeed, the structure of the network for Foetsbrug alone shows the highly symbolic and political nature of the decision. Another indicator for this conclusion is the very low correlation between the control sums of the actors in the empirical network and the Foetsbrug PM network. It is only r=.48.

Conclusions

In the preceding sections we presented five models of collective decision making and applied them to decision making in Amsterdam. In all models decision making is seen as an iterating process consisting of two stages. In the second stage decision makers vote according to their adapted preferences. These preferences are adapted in the first stage through an influence process between actors. The first model is based on an empirically determined influence network, obtained by interviewing actors. In the other models the emergence of access relations in the influence network is simulated by the computer. Actors gradually build their influence network as far as they are able to. In the most simple model, actors try to get access to the most powerful actors, without taking into account the effects on outcomes of decisions. In the more complicated policy oriented models they explicitly take these possible effects into account.

The models are applied on ten decisions in eight issue domains in Amsterdam. The policy oriented models give very good predictions and generate networks that are more diverse than the control oriented models. Moreover, the policy oriented models gave very interesting results when decisions are linked to one another. These models show how effective such linking may be to obtain a certain outcome.

The results confirm earlier results of Stokman and Zeggelink and strongly support a very specific view on the political process. This view can be described as follows.

When trying to establish influence relations with other actors in policy networks, actors are confronted with two counteracting forces. On the one hand they realize that powerful actors with distant and opposite views are most attractive as target. If successful, such a relation will greatly effect the outcomes of decisions. On the other hand, actors realize that these actors are less likely to accept access requests than more proximate actors. Actors realize that other actors act like they do, giving high priority to influence from like-minded other actors. Only if such likeminded others are not present, are actors willing to accept influence from more distant others. Actors therefore select influence purposively to 'bolster' their own position. This prevents them from changing their own preferences while trying to influence other actors to do so. This bolstering effect might be so strong that actors go beyond the point of simply selecting the most proximate actors. Within a certain threshold around their own position, actors select the most powerful ones, but beyond that threshold the least powerful ones.

These results indicate that the largest problems in democratic decision making lie in the unwillingness of powerful actors to accommodate diverging preferences

of other actors. The main problem does not lie in unsufficient opportunities to request access and influence, but in the refusal of powerful actors to accept such requests. One may wonder, therefore, whether hearings and access to important actors through permanent advice committees are effective means to incorporate diverging interests in political decisions. These procedures guarantee only the possibility to make requests, but not their acceptance. The bolstering effect can alienate political authorities from societal interests. This has recently been demonstrated in the Rotterdam and Amsterdam referenda on the division of these cities in several municipalities. Overwhelmingly large majorities rejected the intended divisions, such to the big surprise of political authorities. In our opinion, democratic systems should be more innovative in developing procedures to prevent the bolstering effect among political authorities. The problem is even larger as the bolstering effect is not limited to the political arena, but can explain, at least partly, oligarchical tendencies in organizations as well.

Notes

1. Some early empirical applications can be found in Van den Bos (1991), Stokman and Van den Bos (1992) and Berveling and Van Roozendaal (1992).
2. The contribution of the first autor was partly made during his stay at the Netherlands Institute for Advanced Study in the Humanities and Social Sciences (NIAS), Wassenaar, The Netherlands. We thank Frans Wasseur for the networkanalysis with GRADAP and UCINET. We thank Bob Lieshout and Don Westerheijden for their comments on the description of the dynamic access models.
3. Berveling (1994a) takes also into account decisions by the Mayor and Aldermen and some Commissions of the council.
4. Some departments collaborated with the Germans to register Jewish people.

		AC 010	AC 057	AC 019	AC 039	AC 101	AC 005	AC 004	AC 060	AC 018	AC 001	AC 070	AC 013	AC 016	AC 084	AC 125	AC 009	AC 160	AC 186	AC 011	AC 044	AC 092	AC 017	AC 061	AC 093	AC 066	AC 030	AC 031	AC 063	AC 145	Sum rest	# of rest	Cont r
AC010	Alderman Phys. Planning (v.d.Vlis)	0.17	0.17	0.25	0.16	0.20	0.16	0.16	0.21	0.23	0.17	0.16	0.23	0.20	0.18		0.40	0.33	0.21	0.18	0.25	0.39	0.32		0.19	0.33	0.41	0.24	0.56	0.24	7.14	6	8.70
AC057	Dept. Phys. Planning DRO	0.08	0.08	0.12	0.07	0.09	0.08	0.07	0.10		0.08	0.08	0.11		0.08	0.25		0.15	0.10	0.08	0.12		0.15	0.14	0.09			0.11	0.26	0.11	3.66	8	6.15
AC019	Labor (PvdA) Council faction	0.07	0.07	0.11	0.07	0.09	0.07	0.07	0.09	0.10	0.08	0.07	0.10	0.09	0.08				0.09	0.08	0.11		0.14	0.14	0.08	0.15	0.18	0.10		0.10	1.10	4	3.31
AC039	Secr.Projectgr. IJ-shores	0.04	0.04	0.06	0.04	0.05	0.04	0.04	0.05	0.05	0.04	0.04	0.05		0.04	0.12	0.09	0.07	0.05	0.04	0.06		0.07	0.07	0.04	0.07		0.05		0.05	0.63	6	1.93
AC101	Comp. MBO nv	0.06	0.06	0.09	0.06	0.07	0.06	0.06	0.07	0.08	0.06	0.06	0.08		0.06	0.19		0.11	0.07	0.06					0.07	0.12		0.08			0.43	2	1.91
AC005	Alderman Housing (Genet)	0.07	0.07		0.07	0.08	0.07	0.07	0.09	0.10	0.07	0.07		0.09	0.07		0.17		0.09	0.08		0.17			0.08		0.17	0.10			0.00	0	1.70
AC004	Alderman Finance (Etty)	0.06	0.06	0.09	0.06	0.07	0.06	0.06		0.08	0.06	0.06		0.07	0.06					0.06	0.09	0.14					0.14	0.08			0.33	3	1.56
AC060	Municipal Ground Comp.	0.005	0.04		0.04	0.05	0.04	0.04	0.06		0.05	0.04			0.05	0.14	0.11	0.09		0.05	0.07	0.10			0.08	0.05	0.09			0.06	0.22	3	1.47
AC018	Green-Left Council faction	0.05	0.05		0.05	0.06	0.05	0.05	0.06	0.07	0.05	0.05	0.07	0.06	0.05				0.06	0.05	0.08		0.09	0.09	0.06					0. 07	0.21	3	1.36
AC001	Mayor Van Thijn	0.07	0.07	0.10	0.07	0.08	0.07	0.07			0.07	0.07		0.08	0.07							0.16			0.08			0.10			0.07	1	1.15
AC020	Liberal (VVD) Council faction	0.05	0.05		0.05		0.05	0.05	0.06	0.07	0.05	0.05	0.07	0.06	0.05				0.06	0.05	0.07			0.09						0.07	0.11	2	1.03
AC013	CDA Council faction	0.04	0.04	0.07	0.04		0.04	0.04			0.05	0.04	0.06	0.05	0.05				0.06	0.05	0.07			0.08	0.05					0.06	0.19	3	1.01
AC016	D66 Council faction		0.05		0.05		0.05	0.05	0.06		0.05	0.05	0.07	0.06					0.06				0.09	0.09	0.06					0.07	0.21	3	1.01
AC084	Centre d' Oude Stadt	0.02	0.02	0.04	0.02	0.03	0.02	0.02	0.03	0.03	0.02	0.02	0.03	0.03	0.02	0.08			0.03	0.03			0.04		0.03		0.06	0.03		0.03	0.33	5	0.99
AC125	A'dam Council for Urban Dev.	0.02	0.02	0.03	0.02		0.02		0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.06	0.04	0.04	0.02	0.02					0.02	0.04		0.03		0.03	0.39	5	0.87
AC009	Alderman Public Space (Ten Have)	0.03	0.03				0.03	0.03		0.05				0.04			0.08	0.06		0.03	0.05								0.11		0.27	3	0.73
AC160	Dutch railroad comp. NS	0.01	0.01		0.01				0.02	0.02	0.02	0.01		0.02	0.02		0.03	0.03	0.02		0.02			0.03	0.02	0.03		0.02	0.05		0.21	5	0.56
AC186	Supervisor IJ-shores	0.02	0.02	0.02	0.01	0.02	0.02	0.01		0.02		0.02	0.02	0.02		0.05		0.03	0.02	0.02					0.02			0.02		0.02	0.21	5	0.56
AC 011	Alderman Ec. Dev. Affairs (Van Duyn)				0.04	0.04	0.04	0.04				0.04	0.05	0.04						0.04				0.07		0.07					0.11	2	0.53
AC044	Secr. Phys. Planning	0.01			0.01		0.01	0.01		0.01		0.01	0.01	0.01	0.01	0.03		0.02		0.01	0.01			0.02	0.01						0.24	6	0.41
AC092	Pension Fund ABP	0.02			0.02	0.02	0.02	0.02	0.02		0.02	0.02			0.02		0.04		0.02	0.02		0.04			0.02						0.09	3	0.37
AC017	Green Amsterdam Council faction		0.03					0.03			0.03			0.04	0.04								0.06	0.06						0.05	0.04	1	0.33
AC061	Municipal Harbor Comp.				0.01				0.02			0.01						0.02		0.01				0.02	0.01	0.02					0.09	2	0.21
AC093	Comp. Amlyn bv	0.01			0.01	0.01			0.01	0.01		0.01	0.01		0.01			0.02	0.01						0.01	0.02				0.03	0.06	2	0.19
AC066	Exec. Board Quarter A'dam North	0.01	0.01		0.01	0.01	0.01	0.01		0.01		0.01				0.02			0.01	0.01						0.01	0.01	0.01		0.01	0.08	3	0.18
AC030	PvdA Region A'dam	0.01	0.01	0.01			0.01	0.01		0.01		0.01			0.01					0.01					0.01	0.01	0.02	0.01		0.01	0.07	2	0.17
AC031	PvdA section Center	0.01	0.01	0.01		0.01	0.01			0.01	0.01				0.01	0.03										0.02	0.02	0.01			0.01	1	0.16
AC063	Municipal Transport Comp. (GVB)	0.01	0.01		0.01				0.01			0.01				0.02	0.01	0.01		0.01			0.01	0.01	0.01	0.01			0.02	0.01	0.01	2	0.12
AC145	Newspaper Het Parool	0.01	0.01	0.01	0.01		0.01			0.01		0.01				0.02	0.01		0.01	0.01			0.01							0.01	0.02	3	0.11
AC104	Realestate Comp. Nemeog bv				0.01													0.01												0.08	1	0.10
AC007	Alderman Culture (Albeda)	0.02				0.02		0.01						0.02						0.02											0.00	0	0.08
AC036	Secr. Social Affairs IJ-shores	0.00			0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.01				0.00				0.01				0.00		0.00	0.02	2	0.07
AC046	Secr. Dir. Traffic & Transport	0.00	0.00		0.00		0.00	0.00		0.00		0.00			0.00		0.01			0.00				0.00	0.00	0.00			0.01	0.00	0.02	2	0.06
AC045	Secr. Section Traffic	0.00			0.00					0.00					0.00		0.01			0.00	0.00		0.00		0.00	0.00					0.01	1	0.04
AC070	Prov. Conn. Phys.PLanning	0.00								0.01					0.00																0.01	1	0.03
AC078	Nat. Inspec. Phys. Planning	0.00	0.00		0.00										0.00					0.00											0.02	2	0.03
AC 064	Environmental Affairs				0.01				0.01											0.01											0.00	0	0.02
AC 089	Social Center Middel North			0.01																						0.01					0.01	1	0.02
AC 032	PvdA Section Bos en Lommer						0.01																					0.01			0.00	0	0.01
AC038	Secr. Gen. Affairs & Harbor				0.01																0.01										0.00	0	0.01
AC 108	Architect Benthem & Crouwel		0.00		0.00										0.00				0.00												0.01	1	0.01
AC 109	Architect Blom																									0.00					0.01	1	0.01
AC 169	Platform Soc. Work & Housing		0.00																	0.00											0.00	2	0.01

Figure 2: Empirical network Wagon Lits/Foetsbrug

		AC010	AC057	AC019	AC005	AC001	AC004	AC101	AC016	AC018	AC020	AC060	AC013	AC039	AC011	AC017	AC009	AC084	AC092	AC125	SUM REST	# OF REST	CONTR.
AC010	Alderman Phys. Planning (v.d.Vlis)	0.18	0.20	0.17.	0.22	0.22	0.25	0.27	0.28.	0.28	0.30	0.34	0.34	0.39	0.40	0.48	0.48	0.63	0.31	0.34	00	0	5.88
AC057	Dept. Phys. Planning DRO	0.08	0.09	0.08	0.10	0.10	0.11	0.12	0.13	0.13	0.14	0.15	0.15	0.18	0.18	0.22	0.22	0.29			0.00	0	2.39
AC019	Labor (PvdA) Council faction	0.08	0.09	0.07	0.10	0.10	0.11	0.12	0.12	0.12	0.13	0.15	0.15	0.17	0.17	0.21	0.21		0.14	0.15	0.00	0	2.29
AC005	Alderman Housing (Genet)	0.08	0.08	0.07	0.09	0.09	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.17	0.17						0.00	0	1.52
AC001	Mayor Van Thijn	0.08	0.08	0.07	0.09	0.09	0.10	0.11	0.12	0.12	0.12	0.14	0.14								0.00	0	1.16
AC004	Alderman Finance (Etty)	0.06	0.07	0.06	0.08	0.08	0.09	0.09	0.10	0.10	0.10										0.00	0	0.74
AC101	Company MBO nv	0.06	0.07	0.06	0.08	0.08	0.09	0.09	0.04	0.05											0.00	0	0.52
AC016	D66 Council Faction	0.05	0.06	0.05	0.07	0.07	0.07	0.04	0.08												0.00	0	0.41
AC018	Green-Left Council faction	0.05	0.06	0.05	0.07	0.07	0.07	0.04		0.08											0.00	0	0.40
AC020	Liberal (VVD) Council faction	0.05	0.06	0.05	0.06	0.06					0.08										0.00	0	0.28
AC060	Municipal Ground Comp.	0.05	0.05	0.05	0.06	0.06						0.09									0.00	0	0.26
AC013	CDA Council faction	0.05	0.05	0.04									0.09								0.00	0	0.14
AC039	Secr. Projectgroup IJ-shores	0.04	0.04	0.04										0.09							0.00	0	0.12
AC01	Alderman Ec.Affairs (Van Duijn)	0.04		0.04											0.09						0.00	0	0.08
AC017	Green A'dam Council faction	0.04		0.03												0.10					0.00	0	0.07
AC009	Alderman Public Space (Ten Have)			0.03													0.09				0.00	0	0.03
AC084	Center d'Oude Stadt			0.02														0.09			0.00	0	0.02
AC092	Pension Fund			0.01															0.55		0.00	0	0.01
AC 125	A'dam Council for Urban Dev.			0.01																0.52	0.00	0	0.01
AC007	Alderman Culture (Albeda)																				0.00	0	0.00
AC030	PvdA Region A'dam																				0.00	0	0.00
AC031	PvdA Section Center																				0.00	0	0.00
AC032	PvdA Section Bos en Lommer																				0.00	0	0.00
AC036	Secr. Social Affairs IJ-shores																				0.00	0	0.00
AC032	Secr. Genral Affairs & Harbor																				0.00	0	0.00
AC044	Secr. Phys. Planning																				0.00	0	0.00
AC045	Secr. Section traffic																				0.00	0	0.00
AC046	Secr. Dir. Traffic & Transport																				0.00	0	0.00
AC061	Municipal Harbor Comp.																				0.00	0	0.00
AC1063	Municipal Transport Comp. (GVB)																				0.00	0	0.00
AC064	Environtemental Affairs																				0.00	0	0.00
AC066	Exec. Board Quarter A'dam North																				0.00	0	0.00
AC070	Prov. Comm. Phys. Planning																				0.00	0	0.00
AC078	Nat. Inspec. Phys. Planning																				0.00	0	0.00
AC089	Social Center Middle North																				0.00	0	0.00
AC093	Company Amlyn bv																				0.00	0	0.00
AC 104	Real Estate Comp. Nemeog bv																				0.00	0	0.00
AC 108	Architect Benthem & Crouwel																				0.00	0	0.00
AC 108	Architect Blom																				0.00	0	0.00
AC145	Newspapaer Het Parool																				0.00	0	0.00
AC 160	Dutch Railway Comp. NS																				0.00	0	0.00
AC 169	Platform Soc. Work Housing																				0.00	0	0.00
AC 186	Supervisor IJ-shores																				0.00	0	0.00

Figure 3 CM network Wagon Lits/Foetsbrug

		AC 010	AC 019	AC 057	AC 018	AC 016	AC 001	AC 020	AC 004	AC 005	AC 017	AC 013	AC 011	AC 061	AC 039	AC 044	AC 125	AC 032	AC 186	AC 093	AC 084	AC 063	AC 007	AC 031	AC 160	AC 092	AC 066	AC 030	AC 145	AC 038	sum rest	# of rest	contr.
AC010	Alderman Phys. Pklanning (Vd. Vlis)	0.25		0.26			0.26		0.33	0.28		0.31	0.37	0.04	0.18	0.26	0.02		0.17	0 12	0 44	0.04	0.41	0.04	0.55	0.48	0.04	0.73		0.29	1.3	4	6.75
AC019	Labor (PvdA) Council Fraction	0.11	0.13	0.10	0 17	0.17	0.10	0.19	0.11	0.07	0.25	0.04	0.08	0.23	0.01	0.25	0.25	0.04	0.13	0.25	0.22	0 30	0.04	0.16	0.01	0.23	0.37		0.08	0.07	0.68	5	4.7
AC057	Dept. Physical Planning DRO	0.11	0.10	0.12	0 11	0 13	0.10	0 09	0.10	0.03	0.12	0.14	0.15		0.01		0 08		0.05		0.03		0 12	0.02	0.10	0.02		0.02		0.04	0.47	1	2 13
AC018	Green Left Council Fraction	0.07	0.08	0.06	0.12	0.09	0.06	0.10	0.08	0.03	0.07	0.03	0.04		0.02	0.07	0.05	0.04	0 16	0.03	0.01	0 15	0.10	0.09	0.01	0.01	0.04	0	0.05	030	016	3	1.99
AC016	D'66 Council Fraction	0.07	0.09	0.04	0.09	0.12	0.05	0.11	0.05	0.03	0.09	0.02	0.03	0.15	0.02	0.11	0.08	0.02	0.11	0.07	0.03	0.09	0.03	0.14	0.02	0.02	0.04	0.02	0.07	0.09	0.21	4	1.97
AC001	Mayor Van Thijn	0.09	0.10	0.08	0.13	0.14	0.11	0.09	0.03	0.09	0.08	0.10	0.0040.21		0.17	0.03	0.12		0.08	0.05	0.03	0.04	0.03	0.02	0.05	0.01		0.02			0.12	4	1.93
AC020	Liberal (VVD) Council Fraction	0.07	0.09	0.03	0.09	0.10	0.04	0.13	0.04	0.03	0.07	0.03	0.02	0.11	0.01	0.02	0.12	0.04	0.06	0.09	0.07	0.05	0.01	0.09	0.00	0.05	0.05	0	0.09	0.05	0.06	3	1.59
AC004	Alderman Finance (Etty)	0.07	0.08	0.05	0.10	0.09	0.06	0.08	0.12	0.08	0.08	0.08	0.01	0.03	0.11	0.02	0.06		0.03		0.01		0.01	0. 02	0.02	0.01	0.02	0.05		0.02	0.16	6	1 33
AC005	Alderman Housing (Genet)			0.10			0.09		0.10	0.17		0.11	0.10		0.04				0.02		0.01		0.11		0.16			0.02		0.04	0.12	1	1.01
AC017	Green Amsterdam Council Fraction	0.04	0.05	0.01	0.06	0.06	0.01	0.06	0.01	0.01	0.12	0.02	0.01	0.02	0.00	0.02	0.04	0		0.01	0.02	0.02	0.01	0.11		0.02	0.02		0.09	0.02	0.10	2	0 81
AC013	CDA Council Fraction	0.02	0 06	0.07	0.05	0.03	0.05	0.06	0.00	0.08	0.06	0.08	0.06	0.03	0.11		0.00		0.02						0.01	0.00		0.02			0.04	1	0.76
AC011	Alderman Ec. Affairs (Van Duijn)	0.02	0.05	0.02	0.04	0.04	0.02	0.05	0.00	0.05	0.05	0.02	0 08		0.05	0	0.01				0.00		0.02	0.02		0.01					0.06	2	0.52
AC061	Municipal Harbor company	0.00												0.018		0.00						0.01					0.04				0.38	3	0.44
AC039	Secr. Projectgroup IJ-shores			0.04			0.03		0.01	0.01		0.03	0.02		0.24						0.00		0.01			0.02		0.02			0.06	1	023
AC044	Secr. Physical Planning	0.01							0.00							0.21		0.01				0.03					0.05				0.10	1	0.2
AC125	A'dam Council for for Urban Dev.	0.01	0.02		0.02	0.02	0.01	0.02	0.00	0.00	0.00	0.00		0.01	0.00	0.01	0.13		0.01	0.01	0.00										0.00	0	0.16
AC032	PvdA section Bos en Lommer																	0.85													0.14	2	0.14
AC186	Supervisor IJ-shores	0.02	0.02	0.01	0.01		0.00			0.00		0.00			0.01		0.00		0.14										0.03		0.04	2	0.13
AC093	Company Amlyn BV	0.00	0.01		0.00	0.00	0.00	0.00											0.01	0.34											0.10	1	0.12
AC084	Center d' Oude stadt	0.01	0.04	0.01	0.00	0.00	0.00	0.02	0.01		0.01									0.02	0.13					0.00					0.00	0	0.11
AC063	Municipal Transport Comp. (GVB)	0.00							0.00													0.28									0.10	2	0.1
AC007	Aldetman Culture (Albeda)	0.00	0 02	0.00	0.01	0.00			0.01				0.00		0.01		0.01				0.00			0.10	0.01				0.02		0.00	0	0.09
AC031	PvdA Section Center	0.00	0.01		0.00	0.00	0.00	0.00			0.00				0.01		0.01		0.02					0.30				0.01			0.03	2	0.09
AC160	Dutch Railway Comp NS	0.00	0.02	0.00	0.00				0.01			0.00	0.00		0.02		0.01								0.09						0.02	1	0.09
AC092	Pension Fund ABP	0.00	0.03	0.00	0.00	0.00		0.02	0.01	0.00	0.01										0.00					0.10					0.00	0	0.08
AC066	Exec. Board Quarter A'dam North	0.00							0.00									0.01									0.33				0.04	2	0.06
AC030	PvdA Region Amsterdam		0.01							0.00					0.00													0.09	0.01		0.00	0	0.02
AC145	Newspaper Het Parool	0.00	0.00		0.00	0.00											0.00			0.01									0.57		0.00	0	0.02
AC038	Secr. General Affairs and Harbor		0.01																											0.08	0.00	0	0.01
AC089	Social Center Middle North	0.00	0.00					0 00												0.01											0.00	0	0.01
AC009	Alderman Public Space (ten Have)																														0.00	0	0
AC036	Secr. Social Affairs IJ-shores																														0.00	0	0
AC045	Secr. Section Traffic	0.00																													0.00	0	0
AC046	Secr. Direction Traffic and Transport	0.00																													0.00	0	0
AC060	Municipal Ground Company																														0.00	0	0
AC064	Environmental Affairs																														0.00	0	0
AC070	Prov. Comm. Physical Planning																														0.00	0	0
AC078	Nat. Inspection Physical Planning																														0.00	0	0
AC101	Company MBO NV																														0.00	0	0
AC104	Real Estate company Nemeog BV																														0.00	0	0
Ac108	Architect Benthem en Crouwel																														0.00	0	0
AC109	Architect Blom	0.00																													0.00	0	0
AC169	Platform Soc Work and Housing	0.00																													0.00	0	0

Figure 4: PM network Wagon Lits/Foetsbrug

		AC 019	AC 016	AC 010	AC 001	AC 018	AC 020	AC 004	AC 013	AC 017	AC 011	AC 125	AC 061	AC 007	AC 186	AC 160	AC 063	AC 089	AC 031	AC 169	AC 045	AC 046	AC 109	AC 066	AC 044	AC 145	AC 038	AC 032	AC 030	# of rest	contr
AC019	Labor (PvdA) Council Fraction	0.15	0.19	0.06	0.14	0.22	0.22	0.16	0.13	0.08	0.23	0.32	0.33	0.31	0.33	0.26	0.21	0.15	0.39	0.12	0.16	0.16	0.18	0.09	0 16	0.04	0.02	0.02	0,02	0	4.67
AC016	D66 Council Fraction	0.06	0.16	0.08	0.08	0.04	0.02	0.06	0.04		0.02	0.02	0.02	0.03	0.02	0.05	0.15	0.59	0.02	0.84	0.79	0.65	0.71	0.27	0.03					0	4.58
AC010	Alderman Phys. Pklanning (V.d. Vlis)	0.18		0.33	0.26		0.05	0.26	0.36	0.50	0.26	0.17	0.18	0.17	0.16	0.22	0.12	0.10	0.13	0.02		0.02		0.08	0 10		0.02			0	3.34
AC001	Mayor van Thijn	0.13	0 10	0.12	0.15	0.14	0.13	0.11	0.14	0.13	0.09	0.03	0.07	0.03	0.04	0.19	0.21	0.02	0.16					0 19	0 51			0.04		0	2.57
AC018	Green Left Council Fraction	0.09	0.11	0.09	0.09	0 15	0.10	0.08	0.06	0.05	0.05	0.15	0.14	0.18	0.12	0.05	0.11		0.02					0.09	0.02					0	1.56
AC020	Liberal (VVD) Council Fraction	0.08	0.14	0.02	0.08	0.13	0.15	0.08	0.05	0.03	0.08	0.09	0.07	0.04	0 10	0.05		0 06	0 05		0.02	0.02	0.02		0.02	0.02	0.02			0	1.24
AC004	Alderman Finanance (Etty)	0.08	0.07	0.09	0.07	0.08	0.09	0.20	0.11	0.08	0.03	0.02	0.02	0.03	0.02		0.11		0.02			0.02		0.13						0	1 07
AC013	CDA Council Fraction	0.08	0.08	0.00	0.06	0.10	0.13	0.04	0.10	0.02	0.02	0.02	0.04	0.04	0.05	0.02	0.04	0.02	0.03			0.04		0.04	0.05					0	0.90
AC017	Green Amsterdam Council Fraction	0.07	0.07		0.04	0.07	0.09	0.01	0.01	0.11	0.11			0.01								0.02								0	0.39
AC011	Alderman Econ. Affiars (Van Duijn)	0.03	0.02	0.06	0.03	0.06	0.03	0.01	0.02		0.19	0.01		0.01	0.01	0.01										0.02				0	0.29
AC125	A'dam council for Urban Dev.	0.00	0.02	0.03		0.01	0.00	0.00	0.00		0.01	0.19							0.01											0	0.08
AC061	Municipal Harbor Company	0.00	0.01	0.02	0.00	0.00					0.00		0.13		0.00												0.01			0	0.06
AC007	Alderman Culture (Aibeda)	0.01	0.01	0.03	0.00	0.00	0.00	0.00			0.00		0.00	0.16																0	0.06
AC186	Supervisor IJ-shores	0.01	0.01	0.03	0.00	0.00		0.00			0.01				0.16															0	0.05
AC160	Dutch Railway Company NS	0.00	0.01	0.02	0.00	0.00										0.17														0	0.04
AC063	Municipal Transport Company (GVB)	0.01	0.00	0.00				0.00									0.07		0.01			0.01								0	0.03
AC089	Social Center Middle North	0.00	0.00	0.00				0.00										0.07								0.01				0	0.02
AC031	PvdA Section Center		0.00	0.02															0.16											0	0.02
AC169	Platform Soc Work and Housing	0.00																		0.02						0.00				0	0.01
AC045	Secr. Section Traffic	0.00						0.00											0.00		0.04			0.01						0	0.01
AC046	Secr. Direction Traffic and Transport	0.00						0.00														0.06						0.01		0	0.01
AC109	Arachitect Blom	0.00	0.00																0.00				0.10							0	0.01
AC066	Exec. Board Quarter A'dam North	0.01	0.00	0.00				0.00																0.11							0	0.01
AC044	Secr. Physical Planning	0.01	0.00	0.00																					0.12					0	0.01
AC145	Newspaper Het Parool																									0.92				0	0.00
AC038	Secr. General Affairs and Harbor	0.00																									0.93			0	0.00
AC032	PvdA section Bos en Lommer																											0.94		0	0.00
AC030	PvdA Region Amsterdam																												0.98	0	0.00
AC005	Alderman Housing (Genet)																													0	0.00
AC009	Alderman Public Space (Ten Have)																													0	0.00
AC036	Secr. Social Affairs IJ-shores																													0	0.00
AC039	Secr. Projectgroup IJ-shores																													0	0.00
AC057	Dept Physical Planning DRO																													0	0.00
AC064	Environmental Affairs																													0	0.00
AC093	Company Amlin BV																													0	0.00
AC101	Company MBO NV																													0	0.00

Figure 5: PM network Foetsbrug